

CLAIMS

1. An isolated polynucleotide comprising an open reading frame encoding a polypeptide having alpha-amylase activity, the polypeptide selected from the group consisting of:
 - a) a polypeptide comprising an amino acid sequence which has at least 70% identity with
5 amino acids 22 to 450 of SEQ ID NO:4;
 - b) a polypeptide comprising an amino acid sequence which has at least 70% identity with the polypeptide encoded by the amylase encoding part of the polynucleotide inserted into a plasmid present in the *E. coli* host deposited under the Budapest Treaty with DSMZ under
accession number DSM 15334;
 - 10 c) a polypeptide encoded by a polynucleotide comprising a nucleotide sequence which has at least 70% identity with the sequence shown from position 68 to 1417 in SEQ ID NO:3; and
 - d) a fragment of (a), (b) or (c) that has alpha-amylase activity.
2. The polynucleotide according to claim 1, wherein the polypeptide is an artificial variant
15 comprising an amino acid sequence that has one or more truncation(s), and/or at least one substitution, deletion, and/or insertion of an amino acid as compared to amino acids 22 to 450 of SEQ ID NO:4.
3. The polynucleotide according to claim 1 or 2, wherein the polypeptide comprises an amino
20 acid sequence which has at least 70% identity with amino acids 22 to 450 of SEQ ID NO:4.
4. The polynucleotide according to any of claims 1 - 3, wherein the polypeptide comprises the amino acids 22 to 450 of SEQ ID NO:4.
- 25 5. The polynucleotide according to any of claims 1 - 4, wherein the polypeptide consists of the amino acids 22 to 450 of SEQ ID NO:4.
6. The polynucleotide according to claim 1, wherein the polypeptide comprises an amino acid
30 sequence which has at least 70% identity with the polypeptide encoded by the amylase encoding part of the nucleotide sequence inserted into a plasmid present in the *E. coli* host deposited under the Budapest Treaty with DSMZ under accession number DSM 15334.
7. The polynucleotide according to claim 6, wherein the polypeptide comprises the amino acid
35 sequence encoded by the amylase encoding part of the nucleotide sequence inserted into a plasmid present in the *E. coli* host deposited under the Budapest Treaty with DSMZ under accession number DSM 15334.

8. The polynucleotide according to claim 6 or 7, wherein the polypeptide consists of the amino acid sequence encoded by the amylase encoding part of the nucleotide sequence inserted into a plasmid present in the *E. coli* host deposited under the Budapest Treaty with DSMZ under accession number DSM 15334.

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9. The polynucleotide according to claim 6 or 7, wherein the polypeptide is an artificial variant which comprises an amino acid sequence that has one or more truncation(s), and/or at least one substitution, deletion, and/or insertion of an amino acid as compared to the amino acid sequence encoded by the amylase encoding part of the nucleotide sequence inserted into a plasmid present in the *E. coli* host deposited under the Budapest Treaty with DSMZ under accession number DSM 15334.

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10. A nucleic acid construct comprising a polynucleotide as defined in any of claims 1 - 9 operably linked to one or more control sequences that direct the production of the polypeptide in a suitable host cell.

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11. A recombinant expression vector comprising a nucleic acid construct as defined in claim 10.

12. A recombinant host cell comprising a nucleic acid construct as defined in claim 10, or at least one copy of an expression vector as defined in claim 11.

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13. The cell according to claim 12, which is a microorganism.

14. The cell according to claim 13, which is a bacterium or a fungus.

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15. The cell according to claim 14, which is a Gram-positive bacterium such as *Bacillus subtilis*, *Bacillus licheniformis*, *Bacillus lentus*, *Bacillus brevis*, *Bacillus stearothermophilus*, *Bacillus alkalophilus*, *Bacillus amyloliquefaciens*, *Bacillus coagulans*, *Bacillus circulans*, *Bacillus lautus* or *Bacillus thuringiensis*.

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16. The cell according to claim 14, which is a protease deficient strain of the fungus *Aspergillus*, in particular *A. oryzae*.

17. A method for producing a polypeptide having alpha-amylase activity encoded by a polynucleotide as defined in any of claims 1-9, the method comprising:

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(a) cultivating a recombinant host cell as defined in any of claims 12 – 16 under conditions conducive for production of the polypeptide; and

(b) recovering the polypeptide.

18. A method of producing an enzymatically modified starch derivative, wherein a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 is used
5 for liquefying and/or saccharifying starch.

19. A method of producing high maltose syrups, wherein a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 is used for liquefying starch.

10 20. A method for desizing textile, wherein a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 is used for treating the textile.

21. A brewing process, wherein a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 is added during fermentation of wort.
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22. An alcohol production process, wherein a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 is used for liquefaction starch in a distillery mash.

20 23. A process, wherein a dough product comprising a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 is baked.

24. Use of a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 in a starch conversion process for liquefaction and/or saccharification.
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25. Use of a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 for liquefying starch in a high maltose syrup production process.

26. Use of a polypeptide having alpha-amylase activity produced according to a method as
30 defined in claim 17 for textile desizing.

27. Use of a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 for producing alcohol.

35 28. Use of a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 for brewing.

29. Use of a polypeptide having alpha-amylase activity produced according to a method as defined in claim 17 for baking.